

LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, March 11-15, 2013.

OUT OF THIS WORLD



Artist's rendering of the planetary system HR 8799 at an early stage in its evolution, showing the planet HR 8799c, a disk of gas and dust, and interior planets. Image courtesy of Dunlap Institute for Astronomy & Astrophysics.

A team of international scientists, including a Lawrence Livermore National Laboratory astrophysicist, has made the most detailed examination yet of the atmosphere of a Jupiter-like planet beyond our solar system.

The finding provides astrophysicists with additional insight into how planets are formed.

"This is the sharpest spectrum ever obtained of an extrasolar planet," said co-author Bruce Macintosh, an astronomer at LLNL. "This shows the power of directly imaging a planetary system -- the exquisite resolution afforded by these new observations has allowed us to really begin to probe planet formation." The research appears in the journal, *Science*.

The planet is one of four gas giants known to orbit a star called HR 8799, 130 light-years from Earth. The authors and their collaborators previously discovered this planet, designated HR 8799c, and its three companions back in 2008 and 2010.

To read more, go to the [Web](#).



China's use of coal continues to grow.

China faces conflicting pressures as it strives toward economic growth while wanting to reduce emissions.

While the country's new leaders have declared "ecological progress" will be a priority, changes probably won't be seen until after 2015, when the country's current five-year environmental plan ends, the analysts said.

But, while growth in Chinese coal demand is not as rapid as in the past and not as large as some groups in the U.S. had been projecting, China's use of coal is still growing.

"It (coal consumption) will still continue to grow and grow exponentially," said Julio Friedmann, energy technology chief at Lawrence Livermore National Laboratory and technical program manager for the US-China Clean Energy Research Center for Advanced Coal Technology.

Friedmann said he expects a 50 to 60 percent increase in China's coal consumption in coming years. That's not as large as some experts had predicted, but even so, "I do not see a plateau in the coming years," he said.

To read more, go to [The Guardian](#).



AN UNDERWATER BOSQUE



Looking down, fish swim among a tangle of roots and logs left behind in an ancient forest off the Alabama coast. Photo courtesy of Ben Raines/Press-Register.

The ancient forest found 60 feet underwater about 10 miles offshore of Alabama is much older than originally thought.

Samples of the trees taken during a scuba diving expedition to the forest were sent to the Lawrence Livermore National Laboratory for radiocarbon dating and were found to be more than 50,000 years old.

Scientists who examined the trees remarked on how well preserved the wood was cut into a piece with the unmistakable aroma of newly sawn cypress blooms up, despite millennia spent at the bottom of the Gulf of Mexico. Some of the pieces still had bark on them. The forest was apparently buried under a thick layer of sand for eons until it was uncovered by giant waves during Hurricane Katrina.

To read more, go to AL.com.



A SERIOUS HEALTH ISSUE



Sampling site in Bangladesh where thousands of liters of groundwater were passed through filters to collect bacteria for DNA dating.

Arsenic contamination of the groundwater in Bangladesh is a serious problem. In the Ganges Delta, the affected wells are typically more than 20 meters but less than 100 meters deep.

Groundwater closer to the surface typically has spent a shorter time in the ground, therefore likely absorbing a lower concentration of arsenic. But no matter the depth of the well, a group of researchers including those from Lawrence Livermore National Laboratory have found the arsenic is a due to nature and not man.

The team found that the arsenic in groundwater in the region is part of a natural process that predates any recent human activity, such as intensive pumping.

Millions of people in Bangladesh and neighboring countries are chronically exposed to arsenic-contaminated groundwater, which causes skin lesions and increases the risk of certain cancers. Bacterial respiration of organic carbon releases naturally occurring arsenic from sediment into groundwater, but the source of this organic carbon remains unclear.

To read more, go to [Environmental News Network](#).



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The preamplifiers of the National Ignition Facility, where experiments in fusion ignition were conducted.

The preamplifiers of the National Ignition Facility at Lawrence Livermore National Laboratory are the first step in increasing the energy of laser beams as they make their way toward the target chamber.

NIF recently achieved a 500 terawatt shot -- 1,000 times more power than the United States uses at any instant in time.

NIF is currently used for securing the nation's nuclear arsenal without testing (stockpile stewardship), basic science and working toward a new source of energy.

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LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance. To send input to the *Livermore Lab Report*, send [e-mail](mailto:).